2005 PROGRESS REPORT
To
North Carolina SweetPotato Commission

TITLE: Sweetpotato Breeding and Variety Development Support

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DEPARTMENT: Horticultural Science

REPORT:

Project Objective(s): The objectives of the Sweetpotato Breeding and Genetics Program are: 1) to develop high quality sweetpotato varieties for North Carolina growers that possess exceptional yield, appearance, quality, and disease and insect resistance characteristics; and 2) to conduct basic and applied breeding and genetics studies focused on identifying and incorporating traits of economic importance into sweetpotato germplasm and new cultivars.

Project Summary

Funds provided by the North Carolina Sweetpotato Commission supported all aspects of the breeding program's research. Highlights of our 2005 activities are listed below. A detailed description of the overall activities of the breeding program, advanced clone comments, and tables presenting the results of our advanced, preliminary and National Sweetpotato Collaborators trials follow the project summary. Overall, we experienced a very productive year.

1. The variety Covington was officially released during 2005. A Plant Patent Application for Covington was submitted in September 2005 and is currently pending. In consultation with the NC SPC and the NC CSPSGA, a licensing fee and royalty agreement have been established for in-state and out-of-state producers of Covington that will generate revenue which can be used to benefit the breeding program and contribute to its long-term sustainability.
2. From a production standpoint, Covington was evaluated in large-scale trials by at least five certified seed producers and at least as many growers in many locations in NC. Most, but not all, reports on the performance of Covington (yield, shape, storage quality, pack-out potential, plant bed productivity and plant stand establishment) have been very favorable. We expect over 15,000 acres of Covington to be produced in 2006.
3. To determine the optimal planting, spacing, fertility and harvest dates for Covington, we continued to collaborate with Dr. Jonathan Schultheis and Mr. Allan Thornton to evaluate Covington in replicated research station and on-farm yield trials. Their report on the outcome of the trials is presented later in this publication.
4. In our paired-cross and polycross breeding nurseries we continued our vigorous breeding efforts and generated over 105,000 true seed. These crosses represent the foundation of our program's efforts. Roughly half will be planted in the field for evaluation during 2006.
5. In our early generation breeding plots, we planted 43,375 true seed in research station and on-farm sites, and made 759 new seedling selections. We also planted 520 second-year and 59 third-year selections at the HCRS and CRS as 20-hill and 100-hill plots from which 76 and 17 selections were made, respectively. Each of these selections has the potential to be a new variety, but further testing is required.
6. In our preliminary and advanced clone evaluations, we conducted 7 replicated yield trials of at the Horticultural Crops Research Station (HCRS), Clinton and the Cunningham Research Station (CRS), Kinston. Two clones look promising. One, NC99-573, has been virus-indexed by the MPU and will be subjected to further trialing in 2006 in research station and on-farm trials. Pending the results of these evaluations we will commence trials with seed producers. This clone was shown at our annual field day.
7. We completed our 8th year of the Grower-Participatory Breeding Project (GPBP) and evaluated 14 advanced or preliminary lines in unreplicated trials at our three GPBP sites. Detailed results of these evaluations are reported on in the GPBP report.

8. In our disease nurseries, we evaluated 186 clones for field resistance to Streptomyces soil rot (SSR) in replicated 5-hill plots in our disease nursery at the HCRS. These clones were also screened for Fusarium wilt, root-knot nematode and SSR resistance in replicated greenhouse and field trials.
9. With the MPU, we continued our long-standing collaboration with Dr. Zvezdana Pesic-VanEsbroeck by providing new clones for clean-up and testing, and assisting with the design and evaluation of the "seed source" tests conducted at the HCRS. Detailed results of these evaluations are reported on in the MPU report.
10. We continued our collaboration with Dr. Bryon Sosinski, Director, CALS Genome Research Laboratory and Assistant Professor in Horticultural Science on a sweetpotato applied genomics project to address long-term breeding needs in sweetpotato and develop new breeding tools. As part of this project Mr. Jim Carlos Cervantes, a PhD student working with the program, completed his genetic map of sweetpotato and is currently conducting genetic analyses to identify genes for yield, resistance to sweetpotato feathery mottle virus and root knot nematodes, dry matter content and beta-carotene production in sweetpotato.
11. We also continued our collaboration with Dr. Den Truong, USDA-ARS to evaluate the processing and fresh cut potential of several orange-fleshed clones including Beauregard and Covington, and continued our project to determine the inheritance of anthocyanins in purple-fleshed sweetpotatoes and their potential nutraceutical and natural colorant properties.
12. With additional support from the NC Crop Improvement Association and the NC Certified Sweetpotato Seed Growers, Inc., we continued a long-term project to identify and develop sweetpotatoes more resistant to soil insects. Several putative insect resistant parents have been identified in this project to date and we have begun making paired crosses amongst them.

Project Cooperators

Researchers	Extension	Growers
Dr. Bryon Sosinski	Mr. William Little	Mr. Sonny Scott
Dr. Zvezdana Pesic-VanEsbroeck	Mr. Allan Thornton	Mr. Roger Lane
Dr. Jonathan Schultheis	Mr. Mark Seitz	Mr. Kendall Hill
Dr. Den Truong		
Dr. Gerald Holmes		
Dr. Charles Averre		

2005 Polycross Breeding Nurseries

Two polycross nurseries were established at the Central Crops Research Station (CCRS) in Clayton in 2005. The **Elite Nursery**, designed to produce materials with the potential to become varieties, contains cultivars and near-commercial clones that are outstanding for particular characteristics, such as yield, appearance, and disease and insect resistance are combined and crossed. The **Streptomyces Soil Rot (SSR) Nursery**, dedicated to developing parents with high levels of soil rot resistance has parental breeding material developed by NCSU, LSU, and the USDA. Table 1 provides results of the seed harvests per maternal parent for the Elite and SSR nurseries. For a number of years we had a third nursery, our **High Dry Matter Nursery**, located at the HCRS, designed to develop lines with high levels of dry matter suitable for industrial purposes including the production of bio-based products in sweetpotato. However, we discontinued this polycross nursery this year in favor of paired crosses. Much of the current focus for the high dry matter types is in developing lines with soil rot resistance, but to date we have not identified any lines with high dry matter and soil rot resistance. By making paired crosses we know we have a chance to pick up the resistance in every cross. With the addition of our greenhouse manager we have also begun making paired crosses for table-stock varieties. Polycross nurseries are a good low cost method of producing seed, but there is a great opportunity for specific goals to be reached by paired crosses, and the genetic information gained helps focus our breeding efforts. More than sufficient seed was obtained for next year, from both paired crosses and polycross nurseries.

First-Year Seedling Selections

Research Station Trials

Over 39,000 true seed from the 2004 Elite and SSR polycross nurseries were grown in the Horticultural Department greenhouses starting in February. Seedlings were not evaluated for flesh color because less than 10% of the seedlings screened for this trait are white or cream-fleshed. Also, we are actively pursuing white-fleshed clones with soil rot resistance for the dry matter crosses and this is a way to obtain them. In the field, the seedlings were planted three feet apart so they remained as distinct hills at harvest. Selection at harvest was based on relative yield, shape, flesh color, skin texture, size distribution, root number, earliness, and observable diseases or defects.

Table 2 contains a list of the selections made by nursery and maternal parent at the CRS. A total of 125 selections were made from the 11,757 seed planted from the soil rot nursery for a selection rate of 1.1%. The 12,417 seed from the Elite nursery yielded 182 selections, a rate of 1.5%. Our long-term average is 1.5%.

In addition to the above, we planted 4,375 seed from dry matter paired crosses. This seed addressed some of the adaptation and disease resistance problems we were having little success achieving with high dry matter polycross seed. We made crosses between high dry matter clones (30% + dry matter) and well-adapted, disease resistant clones, with low dry matter. We expect most of the offspring to be intermediate in dry matter, but with some of the necessary horticultural characteristics, especially disease resistance. Selections from these crosses, after evaluation, will make up the next generation of parents. We made 175 selections from the 58 paired crosses resulting in a selection percentage of 4.0%. Shapes do not have to be as pretty as for table-stock material and many of these lines will be discarded for lack of disease resistance.

On-Farm Trials

For the Grower-Participatory Breeding Project, three on-farm sites were used to evaluate 15,120 seedlings. The parents and selections are shown in Table 3. A more detailed report on this project is presented in our GPBP report. Cooperators involved in this project were:

Extension Personnel	Growers
Mark Seitz	Kendall Hill
William Little	Sonny Scott
Allan Thornton	Roger Lane Pride of Sampson

Field sites were located within commercial fields and the trials were treated in the same fashion as the commercial fields (fertilizer, herbicides, etc.) except for the three-foot in-row spacing of seedlings. Selections were made in cooperation with extension personnel and growers. Growing conditions varied from site to site, but all sites yielded selections that had better appearance than the check variety Beauregard. These selections will be planted at the HCRS and CRS in 2005 as unreplicated 25-hill plots for the second cycle of selection. It is very useful for us to select under commercial conditions to identify material adapted to actual growing conditions. Selection percentage over all on farm tests was 2.2%, which is nearly double the average of 1.2%.

During 2002, we established a second component to the GPBP and began evaluating promising breeding lines under commercial conditions. In 2003, 11 advanced breeding lines and three check lines were grown and evaluated at each location as single-row, 100-hill plots. In 2004, 9 advanced breeding lines were evaluated. In 2005, 14 advanced and preliminary lines were evaluated. Notes on how they performed at each location were taken and these are combined with research station data to determine the potential of each as a variety.

Second-Year Selections

In 2004, we made 579 first-year table-stock seedling selections. A few of these rotted in storage or did not sprout in the spring. The remainder (ca. 520) were planted in 20-hill plots at the HCRS and CRS in 2005. Selection criteria were essentially the same as for the first-year single-hill selections, but having a row instead of a hill allows for a better idea of shape and size consistency, and relative yield. Twenty-nine overlapping selections were chosen at both sites. An additional 26 were selected at the CRS and 21 at the HCRS; thus 76 selections remain out of the 520 planted. This number is more slightly than we typically save at this level, usually an indication of a good growing season.

Third-Year Selections

The 59 second-year selections made in 2004 were planted as unreplicated 100-hill plots at the HCRS and CRS in 2005. We selected 17 for further evaluation with four being selected in both locations. Our evaluation criteria remain the same as our second-year selections, but we become stricter for any flaws in appearance, yield and disease susceptibility, etc. at this stage. Next season these clones will go into replicated yield tests in multiple locations. The most promising will be entered into the on-farm trials for a more rapid assessment of their adaptability across environments.

Advanced Selection Trials

Twenty advanced selections were evaluated this year. Ten have been dropped, three have been designated as breeding lines, and the remainder will be tested again in 2006. The most promising clones are described below.

Covington was released during 2005 based on its performance over the last six years (see summary table below). It is similar to Beauregard in appearance, but it has been more uniform in shape and has packed out quite well. It is less prone to making jumbo's than Beauregard, averaging 10% jumbo's vs 14% for B94-14 G2, and producing fewer culls, 8% vs 13% for Beauregard averaged over 29 yield tests (3 in 2001, 7 each 2002 and 2003, and 6 each in 2004 and 2005). We have not seen russet crack in Covington, and the generations used in the 2001 and 2002 yield tests are G4 and G5, respectively. The shapes of Covington have held up very well, which is one of its strengths, and it will generally stay short but if it is planted in cool soils early in the season it has a tendency to produce too many rounds. Overall, Covington tends to size its roots fairly evenly, like Hernandez, and has the potential to produce a reasonably high percentage of number one roots. The yield tests listed below were typically harvested when Beauregard was ready. If Covington is given an additional one to two weeks it will size more canners into the No. 1 class, but relatively few No.1's will become jumbo's further enhancing its productivity. In two locations this year root skin color was noticeably lighter from the stem to distal end. The Beauregard check lines showed some of this effect in the same tests, but not as much. In terms of disease resistance, Covington has tested resistant to Fusarium wilt, and moderately resistant to Streptomyces soil rot and southern root-knot nematodes.

Average performance of Covington, B94-14 Beauregard, and Hernandez over 3 yield tests in 2001, 7 in 2002, 7 in 2003, 6 in 2004 and 6 in 2005.

					Size Distribution by Class (% of total yield)			
	Total Yield	Marketable Yield						
CLONE	bu/A	Bu/A	%Beau	% Hern	No.1's	Canners	Jumbo's	Culls
Covington G2-7	**780**	**720**	**108**	**116**	**58**	**25**	**10**	**8**
B94-14 G2	839	731	100	112	53	20	14	13
Hernandez G2-4	733	668	95	100	53	30	7	9

Note: % Beauregard is determined by adding the percentage Beauregard for each test, then dividing by the number of tests. There were two tests where Covington (NC98-608) was over 200% of the Beauregard yield, thus the average is higher averaged this way than if determined on the overall average, which would be 98%.

SUMMARY DESCRIPTION - Covington

Status Released. Plant patent pending.

Plants:

Vine:	Trailing, dense canopy
Leaves:	Heart-shaped to slightly lobed, green
Sprout production:	Good, but short internodes
Transplant survival:	Excellent

Storage roots:

Shape:	Blocky, stays short
Skin color:	Rose to dark rose
Flesh Color:	Moderately deep orange, uniform
Skin Surface:	Smooth

Characteristics

Yield:	High
Season:	Mid to early
Fusarium stem rot:	Resistant
Pox:	Moderately resistant
Root-knot nematodes:	Moderately resistant
Storability:	Good
Consumer quality:	Good baking and canning quality
Remarks:	Desirable attributes include highly attractive, short roots with high packout. Similar appearance to Beauregard, but more stable shapes. Slight end-to-end color variation occasionally observed. Tendency to form round storage roots in cold or heavy soils. Russet crack has not been observed.
Yield Trial Data:	see table above

NC99-573

This clone produces attractively shaped, smooth skinned, rose-colored roots. Yield is high with a growing season about 10 days longer than Beauregard. Rows of eyes are a concern for appearance, and lenticels are fairly prominent in wet conditions. It is susceptible to root-knot nematodes. This clone is now virus-indexed and will be evaluated as G2 material in 2006.

Average performance of NC99-573, B94-14 Beauregard, and Hernandez over two yield tests in 2002, 4 in 2003, 4 in 2004 and 4 in 2005.

					Size Distribution by Class (% of total yield)			
	Total Yield	Marketable Yield						
CLONE	bu/A	bu/A	%Beau	% Hern	No.1's	Canners	Jumbo's	Culls
NC99-573 G4-7	**877**	**800**	**111**	**125**	**53**	**29**	**9**	**9**
B94-14 G2	874	771	100	117	52	22	14	11
Hernandez G2-4	737	671	91	100	54	29	8	9

SUMMARY DESCRIPTION - NC99-573

Parentage:	L87-95, open pollinated from the 1998 Parallel nursery
Plants:	
Vine:	Trailing, dense canopy
Leaves:	Heart-shaped to slightly lobed, green
Sprout production:	Good
Transplant survival:	Good
Storage roots:	
Shape:	Fusiform to blocky
Skin color:	Rose
Flesh Color:	Moderately deep orange, uniform
Skin Surface:	Smooth
Characteristics	
Yield:	High
Season:	Mid to early
Fusarium stem rot:	Resistant
Pox:	Resistant, but needs further screening
Root-knot nematodes:	Susceptible
Storability:	Has not been stored commercially yet
Consumer quality:	Good baking quality, canning quality unknown
Remarks:	Desirable attributes include highly attractive, smooth skinned fusiform roots. Disease resistance needs further testing.
Yield Trial Data:	see table above
Disposition	Will be extensively trialed in advanced and on-farm trials during 2006.

NC99-573 has been entered into the MPU and been cleaned up. It does have moderately prominent rows of eyes and can be long on occasion. It tends to set more roots than Beauregard.

In addition to NC99-573, 6 additional advanced clones will be evaluated in 2006. Many clones that fall short of becoming a named variety are used as parents based on the multiple tests gathered for release potential. There are ten lines being evaluated for breeding potential and inclusion in the 2006 nurseries, The results of yield tests that included these clones and other promising selections are presented in Tables 4-9. The comment codes used in the tables are described in the Comment Codes Section after the tables. All yields are reported as 50 lb. bushels per acre units.

Purple-Fleshed Breeding Project

Five years ago we began breeding for sweetpotatoes with high levels of anthocyanin content. Our initial efforts focused on identifying material with purple flesh from the US germplasm repository, and acquiring germplasm from international sources. During last two years we made paired crosses using the best purple-fleshed material we had, with well adapted US clones. In 2004, we planted 6,653 seed resulting in 117 selections. Twenty-nine of these were saved in 2005 and will undergo evaluation for anthocyanin content in collaboration with Dr. **Error! Contact not defined.** in Food Science. In addition to the paired cross seed, we obtained and evaluated 575 seed from a polycross nursery acquired from the International Potato Center (CIP). We made 37 selections from these in 2004, but kept only four in 2005. Most were very poorly adapted to our growing conditions as they had good color but very low yield and poor shapes. In 2005, we grew 4,055 seed from 50 paired crosses from which 90 selections were made, and 575 seed from CIP from which 14 selections were made. Our standards were higher in 2005 given that we had better material to select from. Our goals are quite diverse for this material and include 1) fresh market cultivars, 2) chipping lines, and 3) natural food coloring. Crosses have been made between purple-fleshed clones and clones varying widely in dry matter to produce a wide range of physical

properties suited for these different purposes. Evaluation for horticultural traits will be done the same as for tablestock lines, though selection standards will not be as strict until better lines are obtained. Prototype lines were tested on two of the On-farm trials in 2005. This will continue in 2006 to help us rapidly identify ones adapted to NC growing conditions. Our collaboration with Dr. Truong to characterize both the pigments and physical properties is vital for the success of this project.

Disease Resistance Screenings

In addition to the selection and yield evaluation trials, we screened 177 advanced, preliminary, and parental lines for resistance to Fusarium wilt. Of these, 73 of the lines were resistant, 41 had moderate resistance, 26 were moderately susceptible and 37 were rated as susceptible. Susceptible tablestock lines were discarded. Many of the susceptible lines were high dry matter lines. 126 of these lines were also screened for resistance to southern root-knot nematode with 61 resistant, 17 moderately resistant, 23 moderately susceptible and 25 testing susceptible.

Our field SSR screening nursery has completed its eighth year. Soil rot incidence was moderate, but there was considerable damage due to circular spot, and some due to root-knot nematodes and subsequent infection with fusarium and other rots. The presence of all the other diseases made it hard to rate for soil rot damage, but any clones surviving in this site should have high levels of multiple disease resistance. This plot has allowed us to pick parents with multiple disease resistances under field conditions for use in our nurseries. In years with high soil rot pressure, we use this field to measure yield reduction caused by SSR on advanced clones being considered for release. Results of the 2005 test (Table 10) show large differences in marketable yield, but clones differ in the reason why. Some have very high total yield, but the diseases made many of them culls (ex. 01-362), while for others the total yield is vastly reduced versus resistant clones (ex. Jewel). Besides affects on yield the field trial gives information on whether SSR is able to form lesions on the storage root. Our greenhouse test, while very useful, doesn't give us storage root lesion data. Soil rot may affect primarily fibrous roots, storage roots or both depending on the clone and knowing this will help us in developing clones resistant to both.

2005 National Sweetpotato Collaborator Trials

In 2005 we combined our Advanced and National Sweetpotato Collaborators trials, and conducted the test at the HCRS and CRS. Tables 4a and 4b present the results of the 2005 HCRS trial, and tables 5a and 5b the results of the CRS trial. The Clinton site was in an Orangeburg sandy loam. NC99-573 had the highest marketable yield, though this was not significantly different from NC00-720, B94-14 G2 Beauregard, or L99-35. Covington was slightly less than NC99-573, but statistically the same as the other clones. For overall appearance NC99-573 and L99-35 were rated the best, followed by Beauregard and Covington. Covington had an unusually high percentage of jumbo's due to short and stocky shapes. The test had a high number of round roots especially in Covington, Hernandez and NC99-026. Beauregard produced some round roots as well.

In the CRS trial root shapes were good overall, but with moderate tails on most clones. NC99-573 and NC00-720 highest marketable yield, though not significantly higher than Beauregard, and followed closely by Covington and L99-35. Covington had the fewest jumbo's despite a length diameter ratio of 1.5. Appearance was best for Covington and L99-35. Size of number one roots differed considerably between clones, Beauregard and L99-35 both produced large number ones, while Covington produced more roots in the number one class but a smaller average root size. Pimples were a problem in Hernandez, and rows of moderately prominent eyes are a concern with NC99-573. Overall appearance was rated using a subjective 0-9 scale with 0 = very poor, 3= poor, 5=fair, 7=good and 9= excellent. Appearance ratings such as a 6 mean that a clone, in our opinion, was a little bit better than fair (6), but still not good (7).

Clinton National Sweetpotato Collaborators Trial
Description of Official Entries -

Beauregard (B94-14 G2) - Rose skin, orange flesh, moderately smooth skin, fusiform, blocky and ovoid shapes, mid to early season. Overall appearance = 6.

L99-35 (G3) – Rose skin, very deep orange flesh, moderately smooth skin, elliptic to ovoid shapes, mid season. Good overall, a few long irregular hills. Overall appearance = 7.

Covington (**G2)** - Rose skin, orange flesh, moderately smooth skin, round elliptic to ovoid shapes with some round, mid season. Length/diameter ratio = 1.5. Overall appearance = 6.

Unofficial entries in the 2005 National Sweetpotato Collaborator Trial for comparison:

Hernandez (G2) - Orange skin, deep orange flesh, moderately smooth skin, elliptic to ovoid shapes, mid-season. Some pimples, rows of moderately prominent eyes. Overall appearance = 5.

NC99-026 (**G7)** - Copper-rose skin, orange flesh, moderately smooth skin, round elliptic and ovoid shapes, many round, mid-early season. Length/diameter ratio = 1.5. Moderate tails. Overall appearance = 5.

NC99-573 (G7) – Rose skin, orange flesh, moderately smooth skin, elliptic to ovoid shapes, mid season, rows of eyes, moderate tails, good size distribution. Overall appearance = 7.

NC00-720 (G6) – Dark rose skin, orange flesh, moderately smooth skin, ovoid and round elliptic shapes, mid-early season. Ovates and tails. A lot of cracking and disease (Fusarium wilt) Overall appearance = 5

CRS National Sweetpotato Collaborator Trial
Description of Official Entries

Beauregard (B94-14 G2) - Rose skin, orange flesh, moderately smooth skin, elliptic to blocky shapes, early season, moderate misshapes. Overall appearance = 6.

L99-35 (G3) – Rose skin, very deep orange flesh, moderately smooth skin, elliptic shapes, mid season. Overall appearance = 7.

Covington (G2)- Rose skin, orange flesh, moderately smooth skin, elliptic to round elliptic shapes, mid season. Length/diameter ratio = 1.5. Overall appearance = 7.

Unofficial entries in the 2004 National Sweetpotato Collaborator Trial for comparison:

Hernandez (G2) – Copper orange skin, deep orange flesh, slightly rough skin, elliptic to round elliptic shapes, mid to late season. A lot of pimples, moderate tails. Overall appearance = 6.

NC99-026 (**G7)**- Copper rose skin, orange flesh, smooth skin, elliptic and round elliptic shapes, mid season, moderate balls and tails, very chunky. Length/diameter ratio = 1.5. Overall appearance = 6.

NC99-573 (**G7)** – Rose skin, orange flesh, moderately smooth skin, elliptic shapes, mid season, moderate tails, rows of eyes. Overall appearance = 6.

NC00-720 (G6) - Red skin, orange flesh, smooth skin, elliptic to round elliptic shapes, mid-early season. Slightly longer than 99-026, moderate tails. Overall appearance = 6.

Table 1. Sweetpotato True Seed Harvested in 2005.

Maternal Parent	No. Seed/Polycross Nursery CCRS, Clayton Elite	SSR	Total
1880	---	5591	5591
93-50	3815	---	3815
96-61	---	5500	5500
97A-04	3757	---	3757
97A-45	---	2302	2302
97-166	1425	---	1425
97-433	4310	---	4310
98-076	2976	---	2976
98-608	0	---	0
99-026	---	1028	1028
99-088	---	3641	3641
99-524	1551	---	1551
99-573	4376	2343	6719
00-101	4947	---	4947
00-677	1271	---	1271
00-720	---	1735	1735
01-214	5856	---	5856
01-351	4841		4841
01-362	---	2198	2198
02-459	---	4647	4647
Bienville	---	5078	5078
C-58	---	570	570
Jasper	---	217	217
L99-35	4378	2573	6951
Ruddy	2659	3527	6186
Tib 4	---	2846	2846
Unk-05	---	1090	1090
W250	4023	---	4023
	50185	44886	95071

'--- line was not in this nursery.

Table 2. 2005 Sweetpotato seedlings selected at the CRS, Kinston.

Maternal parent	# selections	Maternal parent	# selections
	Seed from the 2004 Elite nursery		
NC1528	8	NC00-677	9
NC96-27	10	Bienville	11
NC97A-04	7	NC C58	19
NC97-166	16	L96-117	12
NC98-076	10	L99-35	7
NC99-524	19	Ruddy	26
NC99-573	15	W250	8
NC00-101	5		
		Total	**182**
	Seed from the 2004 SSR nursery		
NC93-50	4	NC C-58	17
NC97A-45	13	Hernandez	8
NC97-433	11	L95-95	12
NC98-576	4	L96-117	7
NC99-088	7	L99-35	6
NC01-351	1	Tib 4	14
Beauregard	6	W250	9
Bienville	6		
		Total	**125**
		Grand Total	**307**

Seedling Selections Continued on Next Page

Table 3. 2005 Sweetpotato seedlings selected on farm.

Maternal parent	# selections	Maternal parent	# selections
Pride of Sampson, seed from the 2004 Elite nursery			
NC1528	5	NC99-573	16
NC96-27	12	NC00-101	9
NC97A-04	7	NC00-677	6
NC98-076	2	Bienville	13
NC99-524	7	NC C58	9
		Total	**86**
Tull Hill Farm, seed from 2004 SSR Nursery			
93-50	12	Beauregard	7
97-433	28	Bienville	14
98-576	15	C-58	17
99-088	8	L96-117	8
01-351	15	Tib 4	11
		Total	**135**
Scott Farms			
2004 Elite nursery		*2004 SSR nursery*	
NC1528	6	NC97-433	17
NC99-573	13	NC C58	2
NC00-677	13		
NC00-101	1	*2004 Elite and SSR nurseries*	
Ruddy	45	W250	12
		Total	**109**
		On Farm Grand total	**330**

Table 4a. 2005 National Sweetpotato Collaborators/Advanced Yield Trial, HCRS, Clinton, NC Planted: 22Jun05; Harvested: 11Oct05; Days to Harvest: 111.

	Total Yield	Marketable Yield			Size Distribution by Class (% of total yield)			
CLONE	bu/A	Bu/A	%Beau	% Hern	No.1's	Canners	Jumbo's	Culls
NC99-026 G7	850	759	87	94	37	25	27	11
NC99-573 G7	1047	950	109	118	52	21	18	9
NC00-720 G6	970	867	99	107	37	20	31	11
B94-14 G2 Beau.	1006	878	.	109	47	18	22	13
Covington G2	924	849	97	105	34	25	33	8
Hernandez G2	889	810	93	.	49	26	16	9
L99-35 G3	935	871	100	108	53	24	16	7
Grand Mean	946	855	97	107	44	23	23	10
CV (%)	6	8	8	8	14	25	24	37
LSD (p=0.05)	82	96	11	13	9	NS	8	NS

All trials are reported in 50 lb. bu.
*Not official entries

Table 4b. 2004 National Sweetpotato Collaborators/Advanced Yield Trial at HCRS, Clinton, NC - Trait Data. Please see Keys to Tables section at the end of this report for descriptions to the abbreviations.

CLONE	MAT	DM	L/D	SKC	SKT	FL	EYE	LEN	SH	SHV	APP	Comments
NC99-026 G7	ME	19	1.5	cu rs	ms	3.25	7	7	2,5	6	5	v chunky, ^ovates, ~T
NC99-573 G7	M	17	2	rs	ms	3.25	6	6	3,5	7	7	RE, ~T, g sz dist
NC00-720 G6	ME	18	1.5	dk rs	ms	3.25	7	8	5,2	6	5	^ovates, T
B94-14 G2 Beau	ME	18	2	rs	ms	3	8	7	3,6, 5	6	6	~ rounds
Covington G2	M	17	1.5	rs	ms	3.25	7	7	2,5	7	6	too short?, ^ovates-rounds
Hernandez G2	M	20	1.5	or	ms	3.5	6	6	3,5	6	5	~PI, ^ovoids, RE
L99-35 G3	M	19	2	rs	ms	4	8	7	3,5	7	7	good overall, a few long irr.

Comments: Overall very short roots, longer clones looked best.

Table 5a. 2005 National Sweetpotato Collaborators/Advanced Yield Trial at CRS, Kinston, NC. Planted: 22Jun05; Harvested: 18OCt05; Days to Harvest: 118.

	Total Yield	Marketable Yield			Size Distribution by Class (% of total yield)			
CLONE	bu/A	bu/A	%Beau	% Hern	No.1's	Canners	Jumbo's	Culls
NC99-026 G7	884	827	95	112	54	15	24	6
NC99-573 G7	1049	977	112	132	63	18	12	7
NC00-720 G6	1042	972	112	131	58	13	22	7
B94-14 G2 Beau.	1001	886	.	119	59	12	18	11
Covington G2	916	851	97	115	63	22	8	7
Hernandez G2	794	744	85	.	60	17	16	6
L99-35 G3	937	865	99	117	68	15	10	8
Grand Mean	946	875	100	121	61	16	16	7
CV (%)	6	7	6	8	8	16	28	63
LSD (p=0.05)	88	92	10	14	7	4	7	NS

Table 5b. 2005 National Sweetpotato Collaborators/Advanced Yield Trial at CRS, Kinston, NC - Trait Data. Please see Keys to Tables section at the end of this report for descriptions to the abbreviations.

CLONE	MAT	DM	L/D	SKC	SKT	FL	EYE	LEN	SH	SHV	APP	Comments
NC99-026 G7	M	20	1.5	cu rs	sm	3	8	7	3,2	6	6	v chunky, ~balls, ~T
NC99-573 G7	M	18	3	rs	ms	3.25	6	6	3	6	6	~T
NC00-720 G6	ME	19	1.5	red	sm	3.25	7	8	3,2	6	6	slightly longer than 99-026, ~T
B94-14 G2 Beau	E	18	2.5	rs	ms	3	8	8	3,6	7	6	~mishapes, #1's larger than Cov.
Covington G2	M	20	1.5	rs	ms	3	7	7	3,2	7	7	~T
Hernandez G2	ML	22	2	cu or	s flk	3.5	6	7	3,2	6	6	^pi's, ~T,vn but for pi's
L99-35 G3	M	19	2	rs	ms	4	8	7	3	8	7	Very Nice, #1's large, on avg like Beau

Comments: High yielding test. Covington and L99-35 best overall appearance, but very different average size of No.1 roots. Covington smaller No.1's.

Table 6a. 2005 Preliminary 1 Yield Trial at HCRS, Clinton, NC. Planted: 24June05; Harvested: 27Oct05; Days to Harvest: 119.

	Total Yield	Marketable Yield			Size Distribution by Class (% of total yield)			
CLONE	bu/A	bu/A	%Beau	% Hern	No.1's	Canners	Jumbo's	Culls
99-026	1057	852	104	122	34	15	30	20
99-524	943	589	73	84	33	23	7	37
99-573	1077	879	103	133	45	22	15	18
00-720	1003	779	91	120	39	16	23	22
01-351	904	584	66	91	30	18	17	36
01-362	1165	918	110	135	46	15	18	21
02-405	888	727	86	109	57	14	11	18
B94-14 G2 Beau	1099	863	.	133	44	14	21	21
Carolina Ruby	883	540	62	81	32	24	5	39
Covington G2	930	709	81	108	30	21	24	25
Hernandez G2	892	748	92	.	50	20	13	17
Grand Mean	985	744	87	112	40	18	17	25
CV (%)	18	24	28	22	28	27	49	41
LSD (p=0.05)	NS	255	35	35	16	7	12	15

Table 6b. 2005 Preliminary 1 Yield Trial at HCRS, Clinton, NC - Trait Data. Please see Keys to Tables section at the end of this report for descriptions to the abbreviations.

CLONE	MAT	DM	L/D	SKC	SKT	FL	EYE	LEN	SH	SHV	APP	Comments
99-026	ME	18	1.5	lt cu	sm	3	8	7	2,5	6	5	round jumbo's, ^ovoids
99-524	M	18	2	red	ms	3.25	7	7	3,6	5	6	^ESC, some air CR
99-573	M	15	2	rs	sm	3	7	7	3	6	6	~T
00-720	ME	17	2	red	sm	3	8	7	3,6	5	5	MSH
01-351	M	16	2	tan	sm	3.25	8	7	3	7	7	good shapes, ^CR
01-362	M	16	2	rs	ms	3.25	8	8	3,6	6	6	culls-MSH
02-405	M	18	2.5	red	sm	1.75	8	7	3	6	6	^LT, ~CR, ~rots
B94-14 G2 Beau	ME	18	2	rs	ms	3	8	7	3,6	6	7	culls MSH
Carolina Ruby	M	20	2	red	ms	3.25	7	7	3	6	5	^CR, ESC + air CR
Covington G2	ME	16	1.5	cu rs	ms	3	7	7	2	7	6	round jumbo's, too round?
Hernandez G2	M	18	1.5	org	ms	3.25	7	7	2,5	5	4	Round + ovate

Comments: Roots short overall. 01-351 had very good shapes and size distribution and will be used in 2006 nurseries, dropped from clone consideration due to cracking.

Table 7a. 2005 Preliminary 1 Yield Trial at CRS, Kinston, NC. Planted: 22Jun05; Harvested: 18Oct05; Days to Harvest: 120.

	Total Yield	Marketable Yield			Size Distribution by Class (% of total yield)			
CLONE	bu/A	bu/A	%Beau	% Hern	No.1's	Canners	Jumbo's	Culls
99-026	896	868	106	120	61	13	23	3
99-524	891	710	86	99	54	17	9	20
99-573	954	915	112	123	66	20	10	4
01-351	878	817	100	113	63	18	12	7
01-362	1061	908	111	125	53	15	18	14
02-405	686	563	69	78	54	20	8	18
B94-14 G2 Beau	959	820	.	113	54	16	16	14
Carolina Ruby	753	678	83	94	58	25	7	10
Covington G2	898	844	103	116	68	19	7	6
Hernandez G2	802	746	91	.	58	28	7	7
Grand Mean	878	787	96	109	59	19	12	10
CV (%)	11	12	13	11	11	16	45	36
LSD (p=0.05)	134	139	18	18	9	4	8	5

Table 7b. 2005 Preliminary 1 Yield Trial at CRS, Kinston, NC - Trait Data. Please see Keys to Tables section at the end of this report for descriptions to the abbreviations.

CLONE	MAT	DM	L/D	SKC	SKT	FL	EYE	LEN	SH	SHV	APP	Comments
99-026	ME	22	1.5	cu rs	sm	3	7	7	2,5	7	5	T, too round?
99-524	M	22	2	red	sm	3.5	7	7	3,6	7	6	~ESC, ^T, Ruby replacement?
99-573	EM	19	2.5	dk rs	sm	3.25	6	8	3,6	7	6	^^yld, ^#roots w/good size
01-351	M	19	2	clear	sm	3.5	6	8	3,6, 2	6	6	BRD, g shapes, ESC
01-362	E	17	2.5	rs	ms	3.25	6	7	3,6	5	6	OK sh, ^^yld, BRD, ~PI
02-405	M	21	2.5	dk pi	sm	2	6	7	3	6	5	~ESC,~T
B94-14 G2 Beau	EM	20	2.5	rs	s flk	3	8	8	3,6	6	5	
Carolina Ruby	L	22	3	red	sm	3.5	6	6	3,4	6	4	~air CR, long, tapers
Covington G2	M	19	1.5	cu rs	ms	3	7	8	3,6	6	6	
Hernandez G2	ML	20	2.5	cu or	ms	3.5	7	7	3,6	6	5	~T, ^PI

Comments: Good test overall with good average packout. Relatively few culls except for a couple of clones with some early season cracking.

Table 8a. 2005 Preliminary 2 Yield Trial at HCRS, Clinton, NC. Planted: 24June05; Harvested: 27Oct05; Days to Harvest: 124.

	Total Yield	Marketable Yield			Size Distribution by Class (% of total yield)			
CLONE	bu/A	bu/A	%Beau	% Hern	No.1's	Canners	Jumbo's	Culls
02-350	1008	771	89	96	37	16	23	23
02-423	1123	888	103	113	45	20	14	21
B94-14 G2 Beau	1065	896	.	110	52	18	14	15
Covington G2	1049	859	98	106	38	14	31	18
Hernandez G2	960	850	97	.	43	22	24	12
MD810	997	699	80	88	46	19	5	30
Grand Mean	1034	827	93	103	43	18	19	20
CV (%)	14	18	17	13	16	23	40	32
LSD (p=0.05)	NS	NS	NS	NS	10	NS	11	10

Table 8b. 2005 Preliminary 2 Yield Trial at HCRS, Clinton, NC - Trait Data. Please see Keys to Tables section at the end of this report for descriptions to the abbreviations.

CLONE	MAT	DM	L/D	SKC	SKT	FL	EYE	LEN	SH	SHV	APP	Comments
02-350	M	20	1.5	rs	sm	3.25	8	8	3,2,6	6	7	~round, ~VN, nice
02-423	M	20	1.5	lt rs	sm	3.25	8	8	2,3,1	6	5	~CR in Jumbo's, ^^rounds
B94-14 G2 Beau	EM	17	2.5	rs	ms	3	8	8	3,6	6	7	short site made Beau look nice
Covington G2	M	18	1.5	cu rs	ms		7	6	2,6,3	6	5	V round, tight hills, ~curves
Hernandez G2	ML	19	2	cu org	ms	3	7	6	3,6	6	6	~PI
MD810	M	21	2	red	sm	3.5	7	7	3,2,5	5	4	~SPR, VN, ^curves and pears

Comments: A tough test for shape and quality. Culls mainly for cracking and shape. Beauregard best overall.

Table 9a. 2005 Preliminary 2 Yield Trial at CRS, Kinston, NC. Planted: 21Jun05; Harvested: 19Oct03; Growing Days: 120.

	Total Yield	Marketable Yield			Size Distribution by Class (% of total yield)			
CLONE	bu/A	bu/A	%Beau	% Hern	No.1's	Canners	Jumbo's	Culls
02-165	859	741	99	103	63	17	6	14
02-350	750	676	91	93	49	24	18	9
02-423	973	838	114	118	45	13	29	13
02-459	578	532	69	70	56	30	6	8
B94-14 G2 Beau	888	742	.	103	57	15	12	16
Covington G2	828	747	101	104	58	22	10	10
Hernandez G2	782	733	99	.	55	19	19	7
Grand Mean	817	722	97	100	55	20	15	11
CV (%)	13	13	15	13	13	20	31	50
LSD (p=0.05)	156	145	22	21	11	6	7	NS

Table 9b. 2005 Preliminary 2 Yield Trial at CRS, Kinston, NC - Trait Data. Please see Keys to Tables section at the end of this report for descriptions to the abbreviations.

CLONE	MAT	DM	L/D	SKC	SKT	FL	EYE	LEN	SH	SHV	APP	Comments
02-165	E	18	2	cu	ms	4	8	8	3,6, 2	6	6	~ESC, ~air CR, ~PI
02-350	ME	21	2	rs	sm	3.5	8	8	3,6	6	6	^STR, ~VN, BRD insect R
02-423	EM	20	1.5	lt rs	sm	3.25	8	8	2,3	6	4	BRD, ~ESC, v round, ^ID
02-459	M	23	2	lt rs	lt flk	3.25	8	8	3,2	5	5	BRD, fair sh, low yld ^#roots
B94-14 G2 Beau	ME	18	2	rs	sm	3	8	7	3,6	5	5	
Covington G2	M	19	1.5	cu rs	ms	3	7	7	2,3	7	6	round, short
Hernandez G2	M	20	2	cu or	ms	3.5	5	7	3	6	6	~PI, ~tapers

Comments: 02-165 had very good shapes, but overall appearance was knocked down by both early season cracking and some air cracking. Will be tested as a parent in 2006. Covington very short.

Table 10. 2005 Soil Rot Yield Trial at HCRS, Clinton, NC. Planted: 01July05; Harvested: 07Oct05; Days to Harvest: 130.

	Total Yield	Marketable Yield			Size Distribution by Class (% of total yield)			
CLONE	bu/A	bu/A	%Beau	% Hern	No.1's	Canners	Jumbo's	Culls
00-101	819	593	114	103	42	23	8	27
00-720	791	649	122	113	48	23	10	19
00-748	682	551	109	97	44	37	0	18
01-214	478	378	72	66	31	42	6	22
01-334	809	428	84	74	28	23	1	48
01-351	580	317	61	55	31	24	1	45
01-362	776	245	51	43	12	20	0	68
02-405	520	400	78	70	42	32	3	23
99-573	825	618	117	109	45	25	5	25
B94-14 G2 Beau	628	532	.	93	49	32	4	15
BON02-442	504	301	58	53	42	11	7	40
Covington G2	676	577	113	100	51	23	10	16
Hernandez G2	678	571	111	.	55	25	4	15
Jewel	285	164	34	29	16	40	0	44
Grand Mean	646	452	86	77	38	27	4	30
CV (%)	18	22	20	23	22	21	105	34
LSD (p=0.05)	165	144	24	25	12	8	6	15

Comments: A mixture of soil rot, circular spot, and cracking produced very high numbers of culls.

Keys to Tables

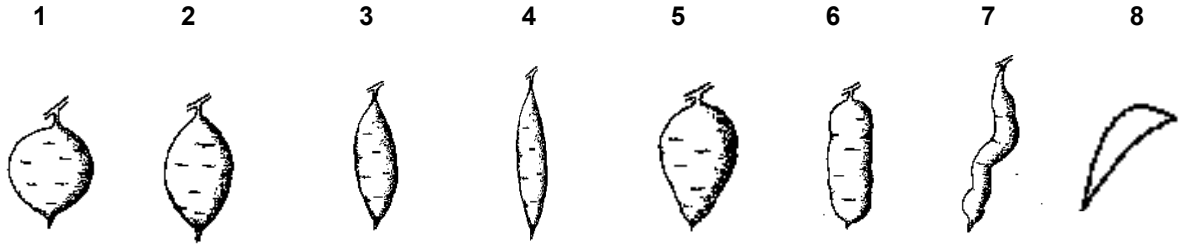
Storage root data: **MAT**=maturity E=early, M=mid and L=Late; **DM**=percentage dry matter; **L/D**=length/diameter ratio; **SKC**=skin color clr=clear cu=copper, lt=light, or=orange, pi=pink, pu=purple, rd=red, rs=rose, tn=tan wh=white; **SKT**= skin texture, m fl= moderate flakiness of skin, l fl= light flakiness to skin, ms=moderately smooth, sm=smooth; **FL**=flesh color (0-5 scale where 0=pure white, 1= cream, 2=yellow, 3= medium orange, 4=deep orange, 5= very deep orange; **EYE**=eyes(0-9); **LEN**= lenticels (0-9); **SH**=Shape (see diagram); **SHV**=shape variability(0-9); **APP**=overall appearance (0-9). All 0-9 scales go from low or poor to high or good.

Comment codes: **AT**=tough attachment; **B**=bumpy shapes; **BRD**=breeding only; **BSR**=bacterial soft rot; **CR**=cracking; **CRK**= crooked shapes; **CS**=circular spot; **CV**=skin color variation end to end; **D**=drop; **ESC**=Early season cracking; **EY**=deep eyes; **FB**=fleabeetle damage; **FS**=Fusarium root rot; **GR**=grooves; **HC**=horizontal constrictions; **ID**=unspecified insect damage; **IRR**=irregular; **JL**=jumbo's for length; **L**=long; **LE**=lenticels; **LG**=longitudinal grooves; **LR**=Lateral rings; **LT**=latex; **MSH**=misshappen roots; **NS**=nice shapes; **OV**=ovate or pear shapes; **PI**=pimples (0-9); **PN**=pencil roots; **PP**=pulled plants; **R**=rodent; **RC**=russet crack; **RG**=restaurant grade; **RH**=root hairs; **RKN**=root-knot nematodes; **RSK**=rough skin; **RT**=rot; **SD**=skin discoloration; **SH**=sheen; **SG**=string roots; **SK**=skinning; **SO**=souring; **SPR**=sprouts; **SR**=soft rot; **SS**=stays short; **SSR**=streptomyces soil rot; **STR**=striations; **T**=tails; **TP**=tapered roots **VN**= veins; **SC**=scurf; **SF**=surface Fusarium; **WB**=whitefringed beetle; **WG**=white grub; **WW**=wireworm; **YCR**=yellow cortical ring; **YLD**=yield; **2^{o}R**=secondary roots.

^ = lots or high amount of, ~ = moderate or some, ↓ = little or poor

(Rating scale: 0 = very severe to 9 = absent)

Shapes



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